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10/574,384

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Laihua Wang

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EXAMINER

KERNS, KEVIN P

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/574,384	<b>Applicant(s)</b> WANG ET AL.	
	<b>Examiner</b> Kevin P. Kerns	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2006 and 02 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☒ Claim(s) 16, 18 and 21-24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/2/07</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
  
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "726" (see page 18, 4<sup>th</sup> line of applicants' specification). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "521" and "541" (Figure 11); and "734" (Figure 14). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The

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disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In this instance, the abstract is not on a separate sheet (the abstract is only a minor portion of the front page of WO 2005/030413 A1), and includes the legal term "comprising" in the 3<sup>rd</sup> and 8<sup>th</sup> lines.

5. The disclosure is objected to because of the following informalities: on page 11, 23<sup>rd</sup> line, delete "20" after "like". Appropriate correction is required.

### ***Claim Objections***

6. Claim 16 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In this instance, since claim 16 only includes an apparatus "for forming a solid product from a molten material", which is dependent on independent claim 1 that includes "for a high pressure die casting system", claim 16 does not further limit claim 1 since high pressure die casting implies that "a solid product is formed from a molten material".

7. Claims 18 and 21-24 are objected to because of the following informalities: in claim 18, 3<sup>rd</sup> line, replace "taper" with "tapered" to be in agreement with claim 17. For claims 21-24, it is believed that the dependencies of these claims should be from claim 17 rather than claim 16 (also see above section 6 for discussion of the claim 16 objection). Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitations "the die cavity" and "the cavity filling". There is insufficient antecedent basis for these limitations in the claim.

The term "high" in claim 8 is a relative term which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Moreover, it is unclear what values/ranges of vacuum that a "high" level of vacuum would include.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 4-8, 16, 17, 21, 22, 24, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Muramatsu (US 5,913,356).

Regarding claims 1, 16, and 17, Muramatsu discloses a chill vent assembly for use with a permanent mold for high pressure die-casting of metals and a method of its use in a high pressure die-casting apparatus to form solid metal products from molten metal (abstract; column 1, lines 5-58; column 2, lines 18-44 and 54-67; column 3, lines 1-34 and 66-67; column 4, lines 1-67; column 5, lines 1-47; column 6, lines 1-14; Examples; Table 1; and Figures 1-3 and 5-10), in which the chill vent assembly 3 and apparatus includes a pair of opposed chill blocks (block structures) divided by a zigzag cavity, or gap d (see assemblies Figures 1-3) that are shown in separated form in Figures 5b, 6b, 7b, 8b, 9b, and 10b to define a continuous vent chamber therebetween, with each of the chill surfaces comprising a plurality of adjoining chill faces (zigzag region) extending the length of the vent chamber d (column 1, lines 24-58; and Figure 1), in which each zigzag chill face has a corresponding (opposite, complementary) zigzag chill face defining a section of the vent chamber, such that the plane of each chill face is oriented at an angle (zigzag angle  $\theta$  of Figure 1) to an adjoining (zigzag) chill face on the respective chill block (Figure 5b with respect to Figure 6b; Figure 7b with respect to Figure 8b; and Figure 9b with respect to Figure 10b -- with Figures 5b, 7b, and 9b being the block structures with recesses, and with Figures 6b, 8b, and 10b being the block structures with projecting, engaging features that engage the corresponding recesses).

Regarding claims 4, 5, and 22, the chill faces of the chill blocks have a corrugated (zigzag) surface defining recessed and extending portions along their faces

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(Figures 1-3, 5b, 6b, 7b, 8b, 9b, and 10b), with the width (gap d) of the vent chamber being constant along its length L (Figures 1 and 3).

Regarding claim 6, the vent chamber is provided with an inlet (adjacent the region connecting exhaust passage 2 with mold cavity 1 of Figure 1) that connects to the outlet of a die casting permanent mold (with mold halves 4), with the inlet having a runner comprising a conduit connecting the base of each section of the continuous vent chamber d of chill vent assembly 3 (column 1, lines 24-58; and Figure 1).

Regarding claims 7, 8, and 21, the vent chamber d is provided with a vacuum port and is connectable to a vacuum source (Figures 1 and 3), of which the circle of Figure 3 is a vacuum pump, the rectangle of Figure 3 is a vacuum tank, and the hourglass shape feature is an electromagnetic valve that enables sealing of the chill blocks of the chill vent assembly 3 against each other to retain a high level of vacuum during filling of molten material (for English translation of these features of Figure 3, also see equivalent Figure 3 of commonly owned US 5,913,355 cited in PTO-892).

Regarding claim 24, the chill faces are provided with a surface coating in the form an oxide film that is enabled by addition of alloy-forming elements that include of one or more of Be, Ni, Al, and Mg (column 4, line 66 through column 5, line 47).

Regarding claim 25, the method of high pressure die-casting of molten metal in a cavity of a die includes the steps of connecting the cavity 1 (see Figure 1) to a chill vent assembly 3 via a first conduit (exhaust passage 2) and connecting a vacuum source of Figure 3 to the vent assembly 3 (defining two engaging chill block structures described as in above independent claims 1 and 17) via a second conduit adjacent the top portion



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of vent assembly 3; evacuating gas from the cavity 1 through the first conduit vent assembly 2 and second conduit to the vacuum source (see Figures 1 and 3); injecting a quantity of molten metal via plunger 5 into the cavity 1 in a sufficient quantity to fill the cavity 1, such that a portion of the quantity of molten metal from the cavity 1 rises into the first conduit vent assembly 2 into the vent assembly 3 to provide a seal to the conduit upon solidification, as the chill vent assembly is at a lower temperature than the mold halves 4 and is capable of solidifying the molten metal; and subsequently removing/ejecting the solidified metal product from the cavity 1 and vent assembly 3 (column 1, lines 24-58; and Figures 1 and 3).

### ***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muramatsu (US 5,913,356) in view of Seefeldt (DE 195 00 005 A1 – also see applicants' admitted prior art on page 3, lines 1-10 of the applicants' specification).

Muramatsu discloses the features of above independent claim 1. Muramatsu does not disclose that at least one of the chill blocks includes a plurality of block modules that fit with an adjoining module and combine with a paired chill block to form the continuous vent chamber assembly.

However, Seefeldt discloses a device that forms a gap connecting to a metal casting die (abstract; and Figures 1-5, as well as page 3, lines 1-10 of applicants' specification), in which the metal casting die connects to the device that forms a gap and connects to an evacuation system (Figures 1 and 2), such that the embodiment of Figure 3 shows a plurality of block modules connected together in parallel to form the assembly, of which the shapes of the conduits vary (in the embodiment of Figure 5), thus establishing more than one gap connecting the die cavity and the surroundings or an evacuation system, thus increasing the venting area (abstract; and page 3, lines 6-8 of applicants' specification).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the chill vent assembly for use with a permanent mold for high pressure die-casting of metals, as disclosed by Muramatsu, by

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using the plurality of block modules connected together to form the assembly, as taught by Seefeldt, in order to establish more than one gap connecting the die cavity and the surroundings or an evacuation system, thus increasing the venting area (Seefeldt; abstract; and page 3, lines 6-8 of applicants' specification).

15. Claims 9-12, 15, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muramatsu (US 5,913,356) in view of Goldhamer (US 3,006,043).

Muramatsu discloses the features of above claims 1, 16, and 17. Muramatsu does not disclose that the chill blocks are provided with holes for passage of cooling fluid to control temperature internal to the chill blocks via a cooling fluid gallery, and a two-part housing having a vacuum port that receives the chill blocks and provides a seal to the chill blocks that are operably connected to an external source (such as vacuum, coolant, and/or compressed gas).

However, Goldhamer discloses a die casting machine and process of its use (column 1, lines 10-29 and 43-71; column 2, lines 1-12 and 36-61; column 3, lines 17-75; column 4, lines 1-45; column 6, lines 11-22; and Figures 1, 3-6, and 12), in which the die casting machine includes chill blocks with corrugated surfaces that cooperate with a securely attached cooling member (24,25) that forms a two-part housing having a plurality of holes in the form of vacuum ports 28 (Figure 12) and cooling ports (P,P') – see Figures 5 and 6, thus forming a continuous cooling fluid gallery internal to the chill blocks, such that the vacuum cooperates with the housing to form a seal in the region within the chill blocks. Regarding the claim 15 limitation “connectable to a source of

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compressed gas”, one of ordinary skill in the art would have recognized that vacuum port 28 and/or pressure gauge 29 (Figure 12) would readily be “connectable” to a source of compressed gas to purge air and contaminants from the chill blocks and die cavity. These additional features disclosed by Goldhamer are advantageous for obtaining solidified metal to form a chill plug to prevent flow of molten metal from the die cavity after more effective removal of all gas, thus resulting in a more uniform temperature of the metal of the casting (column 1, lines 10-29 and 43-71; and column 2, lines 1-12).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the chill vent assembly for use with a permanent mold for high pressure die-casting of metals, as disclosed by Muramatsu, by using the plurality of holes for passage of cooling fluid to control temperature internal to the chill blocks via a cooling fluid gallery, and a two-part housing having a vacuum port that receives the chill blocks and provides a seal to the chill blocks that are operably connected to an external source (such as vacuum, coolant, and/or compressed gas), as disclosed by Goldhamer, in order to obtain solidified metal to form a chill plug to prevent flow of molten metal from the die cavity after more effective removal of all gas, thus resulting in a more uniform temperature of the metal of the casting (Goldhamer; column 1, lines 10-29 and 43-71; and column 2, lines 1-12).

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16. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muramatsu (US 5,913,356) in view of JP 61-38769 (see applicants' IDS dated March 2, 2007).

Muramatsu discloses the features of above independent claim 1. Muramatsu does not disclose that the chill blocks are provided with a pin ejector and a depression port that receives the pin ejector.

However, JP 61-38769 discloses pressure casting equipment with a vent cavity (abstract; and Figures 1-3), in which the vent cavity (best shown in Figure 2) includes fixed chill block 10 and movable chill block 11 defining corrugated surfaces (waveforms 14,15) therebetween, such that the movable chill block 11 is movable by an ejector pin (combination of cylinder 12 and rod 13, of which the rod 13 extends along the entire length of a depression port in the movable chill block 11 – see Figures 1-3), in which the ejector pin is operable to adjust the gap between the chill blocks (10,11) and thereby assist with removal of any solidified metal in the gap, thus sufficiently venting the mold cavity and improving the quality of the cast product (abstract).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the chill vent assembly for use with a permanent mold for high pressure die-casting of metals, as disclosed by Muramatsu, by using the pin ejector and a depression port that receives the pin ejector, as taught by JP 61-38769, in order to sufficiently vent the mold cavity and improve the quality of the cast product (JP 61-38769; abstract).

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17. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muramatsu (US 5,913,356) in view of Hayes (US 6,425,433).

Muramatsu discloses the features of above claims 1, 16, and 17. Muramatsu does not disclose that the vent assembly comprises a pair of wedge main faces aligned to each other at a tapered angle to form thin and thick ends and a wedge-shaped recess therebetween, thus forming the continuous vent chamber.

However, Hayes discloses a die casting vacuum apparatus with a vented chill block attachment (abstract; column 1, lines 18-21; column 2, lines 9-62; column 3, lines 39-65; column 6, lines 27-47; and Figures 2-5), in which the chill block 86 is interposed between a mold cavity 30 and a vacuum line 32, wherein the chill block 86 forms channel portions 88 that are serpentine and of decreasing cross section, thus forming wedge-shaped main faces and a wedge-shaped continuous recess at a tapered angle between portions (82,84) to form thin and thick ends as it approaches the vacuum line 32, thus cooling excess molten material before it reaches the vacuum line (column 6, lines 34-44; and Figure 5).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the chill vent assembly for use with a permanent mold for high pressure die-casting of metals, as disclosed by Muramatsu, by modifying the chill block to have a pair of wedge main faces aligned to each other at a tapered angle to form thin and thick ends and a wedge-shaped continuous recess of decreasing cross section therebetween, in order to cool excess molten material before it reaches the vacuum line (Hayes; column 6, lines 34-44).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin P. Kerns whose telephone number is (571)272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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